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Consumers' Choice of Treatment System for Private Water Supplies

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Citizens Advice Scotland & the DWQR

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Executive summary

This report presents findings from qualitative research carried out among owners of private water supplies, and contractors who perform services on such supplies. The aim of the research was to provide insight into the criteria supply owners and contractors applied when making purchasing decisions regarding water treatment systems and choosing maintenance regimes – specifically, the research aimed to complement findings of previous studies conducted by CAS, in collaboration with DWQR, to inform the development of a comprehensive strategy to improve the quality and resilience of PWS in Scotland.

The research comprised 15 in-depth interviews and two mini-focus groups amongst domestic private water supply owners (with Exempt water supplies), and 15 in-depth interviews and two mini-focus groups amongst non-domestic supply owners (with Regulated supplies), comprising a total of 24 domestic and 23 non-domestic participants. In addition, in-depth interviews were conducted with five private water supply contractors. All fieldwork was conducted between November and December 2018.

The lived experience of using a PWS

Owners were generally satisfied with their private water supply – indeed, most were highly so: they typically described their water as “beautiful” “pure” or “clear”, comparing it favourably to mains water in these respects. They cited the reliability of their supply as another key factor underpinning their satisfaction with it, along with the fact they did not have to pay monthly water charges. Some non-domestic participants spontaneously expressed a level of frustration at the legal obligations they were under to treat and regularly test their supply. It was clear these participants believed such measures were unnecessary and that their supply would be safe left untreated.

The small number of owners who expressed more mixed views, or outright dissatisfaction with their supply, tended to explain this with reference to difficulties they had encountered as a result of it either drying up in the summer, or becoming contaminated following periods of heavy rain; issues that had also been experienced by participants who were generally happy with their supply.

In terms of supplies drying up, participants mentioned that the unusually dry summer in 2018 had had a significant impact; in some instances, leaving them without water for a matter of months. This had left some of them feeling anxious about a possible future recurrence. In terms of contamination following periods of heavy rain, participants made specific reference to their water turning “brown” or “peaty” and/or to their filters becoming clogged with leaves, silt and other debris. While a couple of people found this to be a major source of irritation and something that led them to feel generally dissatisfied with their supply, considerably more were sanguine about it.

Other problems that owners had encountered with their PWSs, albeit less commonly, included raised pH levels; the presence of metals (manganese or iron) or bacterial contaminants (*E-coli*) and problems caused by insects or small animals entering the supply, however, the dominant perspective was that these issues were not particularly serious or concerning.

Accordingly, domestic participants had typically taken little or no action to address these issues. A small number of them had looked into the possibility of having a borehole dug to provide a better quality supply, but had ultimately concluded that the process would be too expensive and onerous.

The non-domestic participants were generally more vigilant in terms of responding to instances of contamination. That said, there was again, a clear sense that some of them approached this task with reluctance, believing their water supply would be safe in the absence of such measures.

All non-domestic participants, and most domestic participants, reported having had their supply tested. In the case of the domestic participants, however, the testing had often taken place around 10 or more years ago. To some extent, such infrequent testing was a reflection of the participants' conviction that their supply was very pure and safe.

Domestic participants who reported having had their supply tested relatively recently commonly identified specific personal triggers for this, in particular, having children or developing an illness that meant their immune system had been compromised. Others said that the testing had resulted from a direct approach by their local authority, whether in the form of a letter or an in-person visit.

Several participants reported having experienced a test failure. The domestic participants who fell into this category had taken no immediate action in response to the failure, which, again, largely reflected their belief that their supply was safe, irrespective of what a test result might show. The non-domestic participants took a more proactive approach, which typically involved cleaning out their system or replacing filters, placing notices next to taps on their premises stating the water was not safe to drink, and/or providing patrons with bottled or mains water instead.

Treatment systems

Very few of the domestic PWS owners interviewed had a treatment system for their private water supply, most commonly, because they felt treating their water was unnecessary, as they and/or others had been drinking and enjoying it in its raw form for many years without experiencing any perceived "ill effects". A second group were more actively resistant to the prospect of treating their water, believing that doing so could negatively affect its quality. A third group stated that treating their water was just not something they had ever considered.

The minority of domestic owners who reported that they did treat their PWS generally did so because they had specific concerns about the quality of their water, as a result of having had it tested, or on the basis of a recommendation from the contractor who installed the supply. Most of the non-domestic owners who took part in the research treated their supply, reflecting the regulatory requirements on commercial supplies.

Some of the treatment systems domestic participants had were home-made and very rudimentary in nature, comprising filters made from household items, ranging from drums or colanders, to pillowcases and tights or compression socks. Among both domestic and non-domestic owners who had a more formal treatment system, this most commonly took the form of one or more particle filters, alongside a UV sterilisation tube, though a minority had additional components such as pH correction, chlorination, filters to remove nitrate or manganese or a carbon filter.

Most of the participants had based their choice of treatment system on a recommendation from their local authority or a contractor, and had undertaken no further independent research on the topic. For their part, contractors themselves mentioned taking into account a range of factors when advising on treatment systems, including: results of water analysis, the location of the site, in terms of its distance from the property and vulnerability to frost and associated costs.

A small number of PWS owners had chosen their treatment system based on their own research, which, most commonly, took the form of a general internet search or looking at the websites of private water supply specialist contractors or

treatment system manufacturers. Owners and contractors alike commented that information about treatment systems provided by manufacturers was generally accessible and clear.

Some PWS owners reported having taken cost into account when choosing their treatment system, opting for one of the cheapest systems they could find. Some had specifically chosen systems which cost £800 or less (within the amount of the Scottish Government grant), even though they recognised this may have meant compromising on quality.

Generally, PWS owners had not considered, or looked for, information about different types of treatment systems. Indeed, many were unaware of any types of treatment system other than the one they had.

There was mixed awareness of the Scottish Government Private Water Supply Improvement Grant. Of all those owners who had heard of the Grant, most had applied for and received it. The dominant perspective on the grant was that it was helpful, and straightforward to access, but did not cover the costs of treatment systems or upgrades. Others, including both owners and contractors, were more negative about the grant; mainly because of perceived conditions attached to it and restrictions around how it could be used.

There was considerable variation in the lengths of time participants' current treatment systems had been in place, ranging from as long ago as they could remember (sometimes in excess of thirty years) to a matter of weeks or days. Participants who made the decision to install their current treatment system had generally employed a contractor to undertake the installation, in most cases a local plumber, though a small number had drawn on the support of PWS specialists. Most owners who had used a contractor reported being generally satisfied with the work. However, it was not uncommon for those who had used a plumber, or another non-private water supply specialist, to report more negative experiences.

A minority of participants had installed their water treatment system themselves. This was typically people with a background in engineering, plumbing or horticulture.

Most of the PWS owners said they were happy overall with their current treatment systems, which they tended to report had been working well since installation. However, when owners were probed more directly on whether they had encountered any issues with their system, two main themes emerged: heavy rain causing filters to clog, and challenges involved in obtaining spare components for treatment systems.

In terms of the ongoing maintenance of their treatment system, owners took varying approaches, ranging from checking the system very regularly, to not checking it at all. Most participants maintained their treatment systems themselves due to the low costs associated and their familiarity with their system. However, contractors commonly described how PWS users sometimes neglected to perform necessary maintenance tasks regularly, if at all, or did so incorrectly.

Wider maintenance of PWS

Both domestic and non-domestic participants commonly reported carrying out wider maintenance on their private water supplies. Ad-hoc repairs were the most common type of maintenance mentioned, and largely took the form of reactive repairs to tanks, plumbing and pumps. Performing general checks on, and cleaning of, supplies was also relatively common, though the frequency with which participants engaging in these activities varied, from weekly to bi-annually or less often. Fewer participants performed additional, seasonal maintenance, for example, in times of frost or hot weather.

A minority of participants felt their supplies did not require *any* maintenance, beyond that carried out on their treatment systems (if applicable). They explained this primarily in terms of their never having experienced any problems with their supply, and not wanting to “fix” what “ain’t broke”.

Contractors reported often coming across reluctance among owners to devote the necessary time and resources to supply maintenance, and, in cases where water sources were shared, conflict between different users around who should take responsibility for maintenance, which in itself was sometimes a cause of inaction.

Generally, PWS owners who did have some form of maintenance regime carried out the work themselves – they regarded it as easy, and reiterated their view that a DIY approach was cheaper than hiring a contractor. Participants who performed their own maintenance work had generally not sought any information or advice on how to do so – considering it common sense, or something that could be easily learnt through trial and error.

Among the minority who had sought information or advice, three sources were cited: the internet; others in their local community, and advice from private contractors. No participants spontaneously mentioned any of the existing online resources for PWS users in Scotland, such as the DWQR website or the Scottish Government online information hub.

Generally, participants who maintained their supplies themselves were satisfied with the amount of time and effort it took, and with the associated costs.

Support for private water supplies

There were varying levels of demand for support and advice among the owners and contractors who took part in the research. On the one hand, some owners who had encountered significant issues with their supply, such as test failures or problems of reliability, were keen to receive support or advice. Others were actively resistant to it, priding themselves on their self-reliance and reiterating a wariness of outside “interference”.

The contractors interviewed generally felt that they had sufficient knowledge and understanding of PWSs, including treatment systems, to provide a full and effective service to owners. Despite this, they were generally receptive to the idea of additional support and advice being provided.

Across the board, there was low awareness of available support provision for PWS users. Those who had looked for advice or guidance on maintaining or treating their supply sometimes commented that it had been difficult find relevant, impartial information. Almost without exception, neither owners nor contractors had heard of the Scottish Government’s online information hub on PWSs. There was marginally more awareness of the guidance on the DWQR website.

Owners who were interested in receiving support or advice relating to their PWS discussed five main areas of need: treatment systems and regimes; maintenance regimes; accessing contingency supplies, water testing, and accessing contractors. In light of difficulties some owners had encountered sourcing contractors, there was an appetite for a list of local approved or accredited contractors that might help in the identification of available expertise – not all participants were aware of existing lists kept by some local authorities. There was somewhat less support for an approved contractor list among contractors themselves, however, on the account that the associated training requirements and/or cost could be set too low– resulting in incompetent contractors becoming accredited.

The contractors interviewed identified three additional forms of support and advice that they would find useful: more independent technical advice on PWSs, increased information on relevant regulatory developments and requirements; and more information on health and safety risks associated with PWSs that they could share with others.

Most owners did not express specific or strong preferences in terms of who should provide support and advice on PWSs. However, there was repeated mention of a need for a non-commercial, independent body to oversee the process. At the same time, some non-domestic owners expressed a desire for improved support from local authorities. For their part, some of the contractors were keen to see the DWQR doing more to engage with them and others delivering PWS services, to keep them updated on developments in relevant regulation and best practice.

In terms of modes for delivering support and advice, owners commonly expressed a preference for online communication, as they could access it from any place. However, others favoured more traditional off-line communications, such as radio, community councils and leaflets. Contractors generally favoured face-to-face forms of knowledge exchange, as they felt it allowed scope for visual demonstrations, and engagement between attendees.

Conclusion and recommendations

The principle objective of the research was to provide insight into the criteria applied by consumers responsible for private water supplies when choosing water treatment systems and maintenance regimes. One of the key findings of the research was that many domestic PWS owners do not in fact have a treatment system and/or maintenance regime and, as such, are relying on water from raw, unfiltered sources. Whilst use of treatment systems and maintenance regimes was more prevalent among *non-domestic* PWS owners, this appeared largely due to the legal requirements upon them – several of them clearly felt that their supply would be safe without treatment, as evidenced by the fact they chose to treat only the supply that served their business, leaving their home supply in its raw form.

Owners who did have treatment systems applied a very limited range of criteria in choosing these. Typically, they based their choice almost entirely on a recommendation from their local authority or a contractor; in essence delegating full decision-making powers to such third parties.

The maintenance regimes owners and contractors performed on treatment systems (and PWSs more generally) varied considerably. Most commonly, owners checked their system and supply every few months, and more frequently during potentially disruptive weather, with other owners taking a more reactive approach, only checking their system or supply if there appeared to be a problem with it.

Most participants maintained their treatment systems themselves, regarding the process as easy and straightforward. A minority of supply owners had their treatment system serviced by a contractor, however, those with such arrangements were typically non-domestic owners, reflecting this group's sense of responsibility for their wellbeing of their customers.

The research pointed to a number of ways in which those responsible for private water supplies may be better supported, in both policy and practice terms, to make better decisions regarding the treatment and maintenance of their supplies. In particular, it points to a need for:

- Information and support on connecting to the mains water supply;
- More engagement with supply owners around water quality testing;

- A review of the Private Water Supply Grant, in order to increase its scope for being used towards a wider range of PWS improvements;
- Raising awareness, and extending the content of, existing sources of information and support; in particular, the DWQR website and Scottish Government information hub;
- Improved support for contractors: particularly in terms of regulatory changes and associated requirements;
- And supporting and streamlining the process for installing boreholes.

Introduction

Background

Citizens Advice Scotland (CAS) works with government, regulators and businesses to put consumers at the heart of policy and regulation in the energy, post and water sectors in Scotland. As a member of the Scottish Government's Rural Provision Working Group¹, CAS is committed to improving outcomes for users of private water supplies (PWS), including improving private water supply quality compliance, and developing information about how to maintain and improve supplies.

In 2017, there were 22,269 registered PWSs in Scotland, supplying drinking water to over 195,961 people (3.6% of Scotland's population), not including the large number of people who used premises with PWSs in the course of leisure or tourism activities each year². PWSs in Scotland are not provided or maintained by Scottish Water and, as such, are not subject to the same levels of maintenance and quality assurance. Instead, the owner or person who uses the supply is responsible for its maintenance; for example, through installing and maintaining a water treatment solution that ensures water from their supply meets minimum quality standards.

PWSs are categorised as either regulated (serving a business or public building, or 50 or more people, or supplying 10m³ of water or more per day) or exempt (not a business or public building, serving fewer than 50 people and supplying less than 10m³ of water a day). In accordance with The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017³, all *regulated* supplies are subject to annual checks and five-yearly risk assessments by local authorities in order to ensure minimum water quality standards. Exempt supplies are not subject to any mandatory checks under the regulations, but are required to be checked by local authorities upon request of the supply owners.

Many private water supplies suffer from inadequate treatment and/or poor water quality. In 2017, the Drinking Water Quality Regulator for Scotland (DWQR) reported that *E. coli* was detected in 23% of regulated and 11% of exempt PWS samples in Scotland. Overall, data collected on exempt PWSs suggests that the quality of such supplies has not improved since 2010, despite local authority and Scottish Government intervention, such as the introduction of the Private Water Supply Grant. This indicates that PWSs are either not receiving the appropriate treatment, or that the existing treatment is inadequate.

Evidence suggests that information available to private water supply owners on how to maintain and test their PWS, as well as information on any external influences that may cause variation in water quality, can be difficult to source, and is often not sufficiently signposted or stored in obvious locations⁴. In addition, there is evidence of varying knowledge of

¹ Comprising: The Drinking Water Quality Regulator (DWQR); Scottish Government; Scottish Environmental Protection Agency; the Water Industry Commission for Scotland; Scottish Water; and Citizens Advice Scotland.

² DWQR, 2018. *Drinking Water Quality in 2017: Private Water Supplies*. <http://dwqr.scot/media/39966/dwqr-pws-annual-report-2017-compiled-report-final-24-september-2018.pdf>

³ The Scottish Government, 2017. The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations. http://www.legislation.gov.uk/ssi/2017/282/pdfs/ssi_20170282_en.pdf

⁴ Consumers Futures Unit, Citizens Advice Scotland. 2017. Testing the waters: Assessing information on private water supplies and sewerage facilities. https://www.cas.org.uk/system/files/publications/cfu_insight_report_testing_the_waters_-_assessing_information_on_private_water_supplies_and_sewerage_facilities.pdf

how to maintain and treat PWSs, among those reliant on such supplies and of awareness of risks and responsibilities⁵. Some PWS owners rely on support from private contractors to help them maintain their supply. Yet, as there is currently no accreditation scheme in place for contractors who install PWS water treatment systems, it is not clear how well equipped they are to provide supply owners with advice on selecting the right system for their supply. Should contractors install treatment systems that are unsuitable, supply owners could be left with water that has not been treated to a compliant standard, and, as such, incur additional costs for alternative treatment.

Against this backdrop, CAS, in partnership with the DWQR, commissioned Ipsos MORI to carry out research with private water supply owners and contractors to provide insight into the criteria these groups applied when making purchasing decisions regarding water treatment systems and choosing maintenance regimes.

Research objectives

The research aimed to complement findings of previous studies conducted by CAS, in collaboration with key stakeholders, to inform the development of a comprehensive strategy to improve the quality and resilience of PWS in Scotland.

Specific themes explored in the research included:

- the considerations and criteria consumers/contractors applied in selecting water treatment systems,
- the external factors that influenced consumers'/contractors' decisions,
- how consumers sourced relevant expertise, and to what degree they delegated decision-making power,
- whether, and (if so) where, consumers/contractors looked for information on different systems,
- the quality of information provided by treatment system manufacturers;
- the nature of consumers'/contractors' maintenance regime.

Methodology

The research was conducted, using a qualitative approach, comprising:

- fifteen in-depth interviews and two mini focus groups with domestic water supply owners;
- fifteen in-depth interviews and two mini focus groups with non-domestic water supply owners;
- five in-depth interviews with contractors who installed and maintained private water supplies and treatment systems.

The sample frame for the domestic and non-domestic owner interviews and focus groups comprised a database of all properties in Scotland using a registered private water supply, provided by the DWQR. Participants were sampled from five local authority areas – Aberdeenshire, Argyll and Bute, Highland, Perth and Kinross and Orkney. These areas were selected due to their having a high penetration of private water supply users, covering a range of different types of

⁵ CREW. 2017. Engaging Communities Around Private Water Supplies. <http://www.crew.ac.uk/publication/engaging-communities-private-water-supplies>

supply⁶. A total of 440 domestic users and 359 non-domestic owners were sampled. Of these, 280 domestic and 269 non-domestic owners were invited to take part in an in-depth interview, and 160 and 90 respectively were invited to take part in a focus group. For the focus groups, a further three participants were recruited via snowball sampling.

All those sampled for owner interviews and focus groups were sent an introductory letter, informing them about the research, and inviting them to participate, with an explanation on how to opt in or out by email, telephone or post. When users opted into the research, a member of the research team contacted them via telephone to check their eligibility (using a bespoke screening questionnaire), answer any questions they had and make the necessary practical arrangements.

Research with domestic PWS users

The 15 in-depth interviews with domestic users were conducted by telephone. The focus groups were carried out in Lochgilphead (Argyll and Bute) and Portlethen (Aberdeenshire), with a total of nine participants attending.

Overall the domestic sample included a broad mix of users in terms of their satisfaction with their private water supply; the specific type of supply they had; their postcode classification in relation to the Scottish Index of Multiple Deprivation (SIMD) and the Scottish Government's urban rural classification⁷; the recency of their last PWS treatment system upgrade/maintenance; as well as their experience of using private water supply contractors. All domestic participants had exempt supplies.

Efforts were also made to recruit a mix of participants based on their age. However, it proved difficult to find owners of private water supplies who fell into the youngest age group (18-34), and, in the event, none were interviewed.

The final achieved sample of domestic users is set out in Table 1.1 below.

Table 1.1: Achieved sample of domestic PWS users

Quota	Number of participants
Local Authority	
Aberdeenshire	7
Argyll and Bute	9
Highland	2
Perth and Kinross	3
Orkney	3
Water source type	
Groundwater	16
Surface water	8

⁶ Four other areas were excluded from potential selection due to their inclusion in a separate research study among PWS users, being conducted by the James Hutton Institute. The areas excluded were: the Isle of Coll; the Kintyre Peninsula; Assynt and Coigach; and areas within Deeside.

⁷ According to the Scottish Government's 6-fold Urban Rural Classification.

<i>Recency of last treatment upgrade/maintenance</i>	
Last 3 years	15
Longer ago	7
Never performed any maintenance	2
<i>Use of contractor for last system upgrade/maintenance</i>	
Yes	11
No	13
<i>Satisfaction with supply</i>	
Satisfied	19
Dissatisfied/Neither satisfied nor dissatisfied	5
<i>Remoteness</i>	
Accessible Rural	7
Remote Rural	15
Unknown	2
<i>Level of deprivation</i>	
Most deprived (SIMD 1-2)	1
Average (SIMD 3)	7
Least deprived (SIMD 4-5)	14
Unknown	2
<i>Age</i>	
18-34	0
35-54	4
55+	20
Unknown	0
<i>Total domestic participants</i>	24

Research with non-domestic PWS users

The 15 in-depth interviews with non-domestic users (all of whom had regulated supplies) were also carried out by telephone. The focus groups were carried out in Inverness (Highland) and Perth (Perth and Kinross), with a total of eight participants attending.

To ensure a broad mix of business types and circumstances, participants were purposively recruited based on their location (local authority); the recency of their last treatment upgrade/maintenance; whether or not they had used a contractor for their most recent upgrade/maintenance; and their overall satisfaction with their private water supply. The final achieved sample of non-domestic users is set out in Table 1.2.

Table 1.2: Achieved sample of non-domestic PWS users

Quota	Number of participants
<i>Local Authority</i>	
Aberdeenshire	2
Argyll and Bute	3
Highland	8
Perth and Kinross	7
Orkney	3
<i>Water source type</i>	
Groundwater	17
Surface water	6
<i>Recency of last treatment upgrade/maintenance</i>	
Last 3 years	18
Longer ago	5
<i>Use of contractor for last system upgrade/maintenance</i>	
Yes	10
No	12
Don't know	1
<i>Satisfaction with supply</i>	
Satisfied	15
Dissatisfied/Neither satisfied nor dissatisfied	8
<i>Remoteness</i>	
Accessible Rural	7
Remote Rural	15
Unknown	1
<i>Level of deprivation</i>	
Most deprived (SIMD 1-2)	0
Average (SIMD 3)	9
Least deprived (SIMD 4-5)	13
Unknown	1
<i>Age</i>	
18-34	0
35-54	5

55+	17
Unknown	1
Total non-domestic participants	23

Research with contractors

Forty private water supply contractors were contacted with the aim of conducting eight in-depth telephone interviews; in total, five interviews were conducted. To ensure a range of contractors, participants were purposively recruited based on whether they were PWS specialists or non-specialists (e.g. a generalist plumbers); the size of their business; the reach of their business; and how long they had been providing PWS services.

The majority of the contractors interviewed were PWS specialists, though one was a specialist in wastewater services, providing private water treatment and maintenance as an adjunct to these services. Most contractors interviewed offered services across Scotland, with some also offering services in parts of England. One provided services only in their local authority area. Some contractors were sole traders, whilst others worked for businesses with up to 10 employees. The length of time they had been providing PWS services ranged from 6 to 20 years.

Discussion guides and interviewing/facilitation

All interviews and focus groups were structured around discussion guides, designed by Ipsos MORI in consultation with CAS. Participants were asked about their satisfaction with, and experience of, using a private water supply; their experience of water treatment systems for their PWS; their experience of maintaining their supplies; and any support or advice they would like to receive regarding the treatment and maintenance of their PWS. Non-domestic participants were asked about the aforementioned issues in relation to running a business, including any impact that problems with water treatment and maintenance had or might have on their business operations.

Separate discussion guides were designed for the in-depth interviews with contractors. Contractors were asked about the range of PWS services they offered; their general experience of providing such services, including the main challenges they encountered; their main sources of information on treatment systems, and how they perceived the quality and availability of such information; and the criteria they applied in recommending treatment systems and maintenance regimes to consumers.

All fieldwork was carried out between November and December 2018 by the Ipsos MORI research team. Domestic and non-domestic users who took part in an in-depth telephone interview were given £25, and those who took part in a focus group £35, as a 'thank you' for their time and to cover any expenses incurred.

All interviews and focus groups were audio-recorded (with respondents' permission). All of the focus group recordings and a selection of the interview recordings were transcribed for analysis purposes. The transcripts and interviewer notes were then systematically analysed⁸ to identify the substantive themes that emerged in relation to each question in the discussion guide, along with key points and illustrative verbatim comments. This ensured that the analysis of the data was

⁸ The interviewer notes, supported by audio recordings and transcripts, were summarised under key thematic headings, structured around the research questions. The resultant 'thematic matrix' was then systematically interrogated to identify the full range of views and experiences on each issue/question; differences in views and experiences (e.g. between domestic and non-domestic users, supply type, local authority etc.); and the relationships between particular views and experiences.

rigorous, balanced and accurate, and that key messages or concepts were highlighted. It was also flexible enough to allow links and connections across different themes or sub-themes to be made, and for moments of interpretive insight and inspiration to be recorded.

Interpreting qualitative findings

Qualitative research does not aim to produce a quantifiable or generalisable summary of population attitudes, but to identify and explore the different issues and themes relating to the subject being researched. The assumption is that issues and themes affecting participants are a reflection of issues and themes in the wider population concerned. Although the extent to which they apply to the wider population, or specific sub-groups, cannot be quantified, the value of qualitative research is in identifying the range of different issues involved and the way in which these impact on people.

Structure of the report

The next chapter of the report describes participants' overall satisfaction, and any issues they had encountered, with their private water supply. Chapter 3 describes their use and experiences of water treatment systems for private water supplies, their experiences of maintaining their water treatment system and their use of contractors for such work. Chapter 4 covers participants' experiences of private water supply maintenance, and Chapter 5 explores their experiences of seeking, and needs in respect of, support and advice. The final chapter outlines a number of recommendations for improving the support available to private water supply users and contractors, based on the research findings.

Acknowledgements

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The lived experience of using a PWS

The householders who took part in the research were using a PWS for a range of reasons but principally because they had inherited the system when they moved into the property and/or because they believed that it was the only source of water available to them – whether because they were located a long way from the nearest mains source, because there were physical barriers in the way in the form of rivers or mountains, or because they lived up a hill. They also commonly contended that connection to the mains would be prohibitively expensive. It was notable, however, that such assertions were not always grounded in research or concrete evidence but rather in simple assumption – most of the participants had never looked into connecting to the mains. To some extent this reflected the fact that very few of them had any desire to connect to the mains, for reasons discussed below.

All of the PWS users who took part in the research owned and oversaw their supply – though a small number of the domestic owners (but none of the non-domestic owners) shared oversight with another party; either their neighbour or landowner. In all but one of these cases, there was no formal agreement in place governing the arrangements; rather the parties discussed and agreed any matters informally. They were generally content with this situation, though one participant commented that she would like to instigate a more formal arrangement in the future – primarily with a view to pursuing connection to the mains.

Overall satisfaction with PWSs

Participants were generally satisfied with their private water supply – indeed, most were highly so. They typically described their water as “beautiful” “pure” or “clear”, spontaneously comparing it favourably to mains water in these respects – which they referred to as “full of chlorine.”

“It's beautiful water, a bit high on the iron content, otherwise it's beautiful both in taste and clarity and I suppose if there is some iron in it, you could call it a mineral water too.”

(Domestic owner, Exempt)

“Oh, the taste, smell, colour, and actually all its quality aspects are far better [than mains water]. There's more minerals etcetera, etcetera. pH is slightly higher, so better stuff all round.”

(Non-domestic owner, Regulated)

“You go somewhere for a cup of coffee, my mum's down in Lochgilphead, you taste the chlorine [in the mains water] and you get used to not having it in the water.”

(Domestic owner, Exempt)

During these discussions, some non-domestic participants spontaneously expressed a level of frustration at the legal obligations they were under to treat and regularly test their supply. It was clear these participants believed such measures were unnecessary and that their supply would be safe left untreated.

"I'm very satisfied [with the quality of the water], but I can't give that water to my tourists, I have to have a special [treatment system] installed...it's the law. I don't have it at my house, I've drunk the water for 40 years, but they insist."

(Non-domestic owner, Regulated)

Besides considerations of quality, participants cited the reliability of their supply as another key factor underpinning their satisfaction with it, along with the fact they did not have to pay monthly water charges.

Paradoxically, however, the small number of participants who expressed more mixed views or outright dissatisfaction with their supply, tended to explain this with reference to difficulties they had encountered as a result of it either drying up in the summer, or becoming contaminated following periods of heavy rain; issues that had also been experienced by participants who were generally happy with their supply.

In terms of supplies drying up, participants mentioned that the unusually dry summer in 2018 had had a significant impact; in some instances, leaving them without water for a matter of months⁹. While their local authority had come to their assistance providing bottled water and, in one case, access to showers in a leisure centre, the experience of being without water has left them feeling anxious about a possible future recurrence. Consequently, some had opted to have a backup water storage tank installed, at some expense, or were considering exploring connection to the mains.

"My holiday house on the farm it kept going, but my house ran out and I had no water for cows, because I was feeding the cows from my borehole...I had no water for about two months."

(Non-domestic owner, Regulated)

"I mean, if it were to get close enough, I think we probably would go on the mains because we were worried this summer of course, when it was really hot and it didn't rain, and it would be nice to have it available."

(Domestic owner, Exempt)

In terms of contamination following periods of heavy rain, participants made specific reference to their water turning "brown" or "peaty" and/or to their filters becoming clogged with leaves, silt and other debris. While a couple of people found this to be a major source of irritation and something that led them to feel generally dissatisfied with their supply, considerably more were sanguine about it: they saw such issues as part and parcel of having a PWS and certainly not something to be concerned about. Indeed, they appeared to take pride from being self-reliant and stoical in the face of such circumstances.

"[In] July, August [the water] gets the darkest, the brownest tint. But, as I say, we have a spring right next to the house we can get water from...Keep you going for a few weeks. Only happens every sixth or seventh year it's dry. Not often. So not a big problem to be in."

(Domestic owner, Exempt)

⁹ It should be noted that research was conducted soon after an unusually dry summer in Scotland.

"[It doesn't bother me when it's brown] because give it a few days, if the rain eases off, it'll come clean again, there's a natural filtration system in the rock."

(Non-domestic owner, Regulated)

"...we have the odd time when it goes a little bit brown, but, no, it doesn't bother us, I think because I grew up with grandparents who were on private water, so I'm used to it."

(Domestic owner, Exempt)

Beyond the two issues outlined above, other problems that participants had encountered with their PWSs, albeit less commonly, included raised pH levels; the presence of metals (manganese or iron) or bacterial contaminants (*E-coli*); and problems caused by insects or small animals entering the supply. Again, however, the dominant perspective was that these issues were not particularly serious or concerning – indeed, it was not uncommon for participants to express a belief that they had developed a natural immunity to impurities in their water (including *E-coli*), as a result of sustained exposure to them.

"Where I was before the supply was from a loch and there was a let house there and they came down and said, 'oh, there's tadpoles coming through the tap'. I said, 'are they alive or dead?' 'Oh, they're alive.' I said, 'well that proves it's very good water.'"

(Non-domestic owner, Regulated)

"My neighbours who get water from our ground, they have got E. coli in the water... But, that didn't make me test mine because I'm feeling quite healthy."

(Non-domestic owner, Regulated)

"You do build that immunity obviously when you're drinking it over years."

(Non-domestic owner, Regulated)

Reflecting such views, the domestic participants who had experienced the sorts of problem outlined in the previous paragraph had typically taken little or no action to address these. A small number of them had looked into the possibility of having a borehole dug to provide a better quality supply but had ultimately concluded that the process would be too expensive and onerous. This view was supported by one of the PWS specialist contractors interviewed, who expressed "frustration" at what he described as the lengthy and unnecessarily complicated process for obtaining planning permission for boreholes.

"It's just the bureaucracy of having to go through it all now because... I think nowadays you need permission from SEPA to be able to [put in a borehole], there was none of it when we put it in."

(Non-domestic owner, Regulated)

"And it's not just boring, is it, you've got to pump after that, and of course the deeper it is, the bigger the pump and more expensive, the pump."

(Non-domestic owner, Regulated)

"If you ask [a local authority about drilling a borehole] they will say, 'oh, you better go to the planning system'. You go into the planning system and they just say, 'yes, here is your planning approval.' There is no added value in the planning process ...The SEPA regulations that we adhere to [reflect] best practice for drilling a borehole...so the planners aren't really adding anything...A borehole is the best source of water available and for us to have to go through the planning process just makes it more difficult and makes it a turn off for people.

(Contractor, private water supply specialist)

The non-domestic participants were generally more vigilant in terms of responding to instances of contamination. That said, and as illustrated more fully below, there was again, a clear sense that some of them approached this task with reluctance, believing their water supply would be safe in the absence of such measures.

Supply testing

All non-domestic participants and most domestic participants reported having had their supply tested. In the case of the domestic participants, however, the testing had often taken place around 10 or more years ago. To some extent, such infrequent testing was a reflection of the participants' conviction that their supply was very pure and safe. It also reflected a concern that testing would open them up to unnecessary attention or "interference" from authorities; something they were keen to avoid.

"The last time we had it tested here I would say was about 10 years ago and someone came along and took a little sample. But I think that was probably the last time."

(Domestic owner, Exempt)

"[I had the water tested] 50 years ago. Just when I built the house and connected it."

(Domestic owner, Exempt)

Domestic participants who reported having had their supply tested relatively recently commonly identified specific personal triggers for this; in particular, having children or developing an illness that meant their immune system had been compromised. Others said that the testing had resulted from a direct approach by their local authority, whether in the form of a letter or an in-person visit.

"My wife had a baby, so we thought then it was time to get it tested again...for making up milk and things like that."

(Non-domestic owner, Regulated)

"I've got a feeling we might have had some kind of letter and then we responded to the letter and someone come out and just taken a sample out, or I think we delivered a sample."

(Domestic owner, Exempt)

Several participants reported having experienced a test failure. The domestic participants who fell into this category had taken no immediate action in response to the failure, which, again, largely reflected their belief that their supply was safe, irrespective of what a test result might show. The non-domestic participants took a more proactive approach, which typically involved cleaning out their system or replacing filters, placing notices next to taps on their premises stating the water was not safe to drink, and/or providing patrons with bottled or mains water instead. Some of them implicitly questioned the necessity of such measures, however. For example, an owner of a holiday let whose supply had temporarily been designated “unfit for human consumption” following a test failure, reported that his guests continued to drink it despite him advising them they should not, and he appeared sanguine about this. Another holiday let owner described how he had deliberately not informed his guests when he experienced a test failure, choosing instead to wait until there was a break in his bookings to turn the water off and change the filters.

Treatment Systems

Use of treatment systems

Very few of the domestic PWS owners interviewed had a treatment system for their private water supply. They tended to give one of three main reasons for this. First, and most commonly, there were those who felt treating their water was simply unnecessary, as they and/or others had been drinking and enjoying it in its raw form for many years without experiencing any “ill effects”. Based on this, they felt that treating the water would entail unwarranted hassle, “bother” or cost.

“I don't see any reason to [treat the water].”

(Domestic owner, Exempt)

“Everything seems to be okay and it's just like anything else, if everything seems fine you don't really bother... We've never had any problems, we've never really bothered with treating it.”

(Domestic owner, Exempt)

“My two kids were brought up on our private supply before we upgraded it and [had] no ill effects.”

(Domestic owner, Exempt)

The contractors interviewed commonly described encountering such views in the course of their work, and also reported what they saw as a more general “ignorance” on the part of many PWS owners as to the potential risks associated with using untreated supplies. They noted that this ignorance was sometimes manifest in domestic PWS owners resisting their advice to install a treatment system, or to move from a surface supply to a ground supply.

“Somebody who has been drinking water from the wells for the last 400 years doesn't understand why he needs to filter [it] now.”

(Contractor, Non-private water supply specialist)

“Some people just think, they've drunk the water for years, ‘why would you have a disinfection system? It's never done me any harm’ is something I hear on a daily basis. ”

(Contractor, Private water supply specialist)

"There might be a lot of occasions where if nobody is testing the water they just won't know [there's anything wrong with it]. It might be equipment that they have inherited, it might be, 'oh, well, the landlord is supposed to look after that, but he never does, and I'm not going to spend money on his kit'. So, there is quite a variety of reasons and just general ignorance."

(Contractor, Private water supply specialist)

Some of those owners who did not have a treatment system cited a test failure or incidence of bacteria or illness as circumstances in which they might consider installing one, but they were very lukewarm in their comments, using words such as "maybe" or "probably". Further, the 'systems' to which they referred sometimes took the form of very rudimentary or short-term fixes, such as temporarily using a sterilisation fluid.

"If we had cause for concern and someone suddenly became very ill...then maybe we would [treat the supply]."

(Domestic owner, Exempt)

"If I did have a problem with bacteria, probably what I would do is start using Milton for a short while until the problem was resolved."

(Domestic owner, Exempt)

A second group of domestic owners were more actively resistant to the prospect of treating their water, believing that doing so could negatively affect its quality. They again contrasted what they perceived as the "pure" or "perfect" quality of their water with the impure or, as one person put it, "poisonous" nature of treatment aids such as chlorination.

"If it's not broke, don't mend it...it's perfect water."

(Domestic owner, Exempt)

"I know that there's UV, but I wouldn't do it and I certainly wouldn't use any chemicals...I wouldn't be happy putting any poison into my water, do you know what I mean?... I mean if you've got such a good water supply, why do anything that might damage it."

(Domestic owner, Exempt)

A third group of domestic owners stated that treating their water was just not something they had ever considered. They described how using untreated water was something people in rural areas had been doing all their lives and so largely took for granted. Still, this group was open to considering installing a treatment system, particularly if they were provided with financial support to do so. Indeed, on being informed of the Scottish Government Private Water Supply Improvement Grant or, in the focus groups, hearing other participants' positive experiences of the grant, they often expressed interest in making an application.

The minority of domestic owners who reported that they did treat their PWS generally did so because they had specific concerns about the quality of their water, as a result of having had it tested, or on the basis of a recommendation from the contractor who installed the supply. Others said that their treatment system was already in place when they moved into the property, so they just continued to use it without much conscious reflection on the matter.

"[The local authority] recommended that I install filters and a UV steriliser, and after a considerable time I got round to doing that."

(Domestic owner, Exempt)

"I don't know that we particularly chose this system, it's just what was there, what has been historically there."

(Domestic owner, Exempt)

Most of the non-domestic owners who took part in the research did treat their PWS, reflecting the regulatory requirements on commercial supplies. While they were generally accepting of the need to do so, some reiterated their sense of frustration about the effort or expense involved, and/or echoed the view of some domestic participants that their water would be fine to use treated.

"It costs a lot of money, filters are really expensive, [and are] a constant nuisance."

(Non-domestic owner, Regulated)

Types of treatment systems used

Some of the treatment systems domestic participants had were home-made and very rudimentary in nature; typically, these comprised filters made from household items, ranging from drums or colanders, to pillowcases and tights or compression socks. The participants concerned were convinced of the effectiveness of these DIY solutions and appeared to take great pride in the resourcefulness they felt they had shown in developing them.

"The best thing is actually these things you get in hospital to stop the thrombosis. They're very good filters. But I've used lately a very large drum because we used to have a small filter which we would renew every six weeks or something...Four holes and a big nylon pillow slip over it, and that gives us pretty good water."

(Domestic owner, Exempt)

"One year we did find a whole dead sheep in one of [the streams] ...[so] we've got filtration [and] a lot of stockings as well."

(Domestic owner, Exempt)

"My parents' spring fed water supply...had no filter, and it [just] had a colander stuck over the end of the pipe. So that was the only filter on it. And everyone on the estate drank that water."

(Domestic owner, Exempt)

One of the contractors interviewed, a PWS specialist, had encountered such makeshift treatment systems in the course of his work. He expressed a view that such systems could be effective even though, intuitively, they may appear inadequate.

"...Sometimes I come across systems which somebody dreamt up out of the blue...I've seen, you know, ladies' tights used and wellington boots, and I absolutely know that's not correct, and they're not approved materials, but sometimes they work... If it works, and it's not posing any additional harm to health, why should that not be tolerated, or allowed?"

(Contractor, Private water supply specialist)

Among those owners who had a more formal treatment system, this most commonly took the form of one or more particle filters, alongside a UV sterilisation tube. A minority of both domestic and non-domestic owners had additional components such as PH correction, chlorination, a nitrate filter, a manganese filter or a carbon filter. This was generally because they had become aware of particular naturally occurring characteristics of their water, such as specific metal or mineral components. However, in a small number of cases, it reflected concerns they had about the impact of agricultural activity on their supply, particularly in terms of potential contamination from fertilisers.

"It goes through a particle filter and then it comes out and goes through a UV tube."

(Non-domestic owner, Regulated)

"There's a 30 micron and a five-micron filter, and then there's an ultraviolet steriliser."

(Domestic owner, Exempt)

"I have the pH filter because it was the high acidity of the water that was eating the pipes."

(Domestic owner, Exempt)

"The amount of fertilisers [the farmer] uses and stuff. That's one of the reasons why we put the nitrate filter in."

(Domestic owner, Exempt)

Most of the participants had based their choice of treatment system on a recommendation from their local authority or a contractor, and had undertaken no further independent research on the topic. This was corroborated by the contractors interviewed, who consistently reported advising on and influencing their clients' choice of system.

"I just didn't know much about it, I just took advice. [The local authority] just said, 'this is a good one'; I said, 'okay, I'll have that one.' "

(Non-domestic owner, Regulated)

"I did go to [a specialist contractor] to find out what size of filter and so forth I needed, so I did get commercial advice."

(Non-domestic owner, Regulated)

"Once you get to that stage, at the end of the day they mostly just accept guidance."

(Contractor, Private water supply specialist)

"I try to make them understand why it's all necessary, all the component parts and hopefully they understand what I'm going on about."

(Contractor, Non-private water supply specialist)

The contractors themselves mentioned taking into account a range of factors when advising on treatment systems, including: results of water analysis; the location of the site, in terms of its distance from the property and vulnerability to frost; and associated costs.

"The water, the chemical analysis, the biological analysis, and the location of the site if it is out in the frost...Otherwise the cost."

(Contractor, Non-private water supply specialist)

"You need to know...how deep is the borehole, [and] how far away from the property it is."

(Contractor, Private water supply specialist)

A small number of PWS owners had chosen their treatment system based on their own research, which, most commonly, took the form of a general internet search or looking at the websites of private water supply specialist contractors or treatment system manufacturers. They had mostly found this information readily available, though often noted that they had not spent much time looking, and had simply honed in on one of the first websites in their search results. They had found the information to be clear.

For their part, contractors also commented that information about treatment systems provided by manufacturers was generally accessible and clear, with one contending that it was in manufacturers' interest to make it comprehensible in order that people buy the systems:

"Oh, [suppliers] have got to make [information about treatment systems] easy to understand haven't they? If they don't make it easy to understand nobody buys it."

(Contractor, Non-private water supply specialist)

Some PWS owners reported having taken cost into account when choosing their treatment system, opting for one of the cheapest systems they could find. Some had specifically chosen systems which costs £800 or less (within the grant amount), even though they recognised this may have meant compromising on quality. Contractors similarly commented on the tendency of PWS owners to opt for cheaper treatment systems, to save money in the short term. They went on to note that this could ultimately lead to higher maintenance costs or problems with water quality further down the line.

"I looked at one reverse osmosis [treatment system], but that was really expensive."

(Domestic owner, Exempt)

"It was an £800 grant, so that was what it bought, so I wasn't going to get a top quality one as I only had 800 pounds in a grant, I think they must have known how much they cost to give you that amount of money."

(Non-domestic owner, Regulated)

"For instance, you could have a low level of iron in your water, just in exceedance of the regulations, and you could put in a carbon filter, that's going to work. But it won't work in six months' time, and so there'll be very high ongoing costs to maintain that bit of equipment. Whereas the correct strategy may have been something like an oxidising filter."

(Contractor, Private water supply specialist)

Generally, and as is implicit in the foregoing, PWS owners had not considered, or looked for, information about different types of treatment systems. Indeed, many – mostly those with two or three filters and a UV sterilisation – were unaware of any other types of treatment system.

There was mixed awareness of the Scottish Government PWS Improvement Grant. Those who were aware of the grant had most commonly heard about it through a letter from their local authority, though the contractors reported recommending the grant to their clients

Of all those owners who had heard of the Grant, most had applied for and received it. The dominant perspective on the grant among this group was that it was helpful, and straightforward to access, but did not cover the costs of treatment systems or upgrades and had to be supplemented at PWS users' own expense. Indeed, there were a small number of participants who had decided not to apply for the grant because they considered that the amount was not worth the effort.

"I mean, £800 wasn't a huge amount, and we got a quote and it was going to cost us like four or five grand so we did it ourselves, and we did it for about £1,800 I think in the end, in total, minus the £800."

(Domestic owner, Exempt)

Others, including both owners and contractors, were more negative about the grant; mainly because of perceived conditions attached to it. Several participants commented that the upgrades they had been required to make to receive the grant had cost well over £800.

"The grants are good but they make you do so much and you end up spending a lot more in the end. I mean, they had me fixing fences."

(Domestic owner, Exempt)

"It almost seems like the grant that's offered would be nullified by the extent you'd have to filter the water...So in order to get it over to pass their guideline it would cost so much, so it wouldn't actually be worth doing. So yeah, it's just really a cost issue."

(Domestic owner, Exempt)

Less commonly, negativity about the grant related to perceived restrictions around how it could be used. The main point made in this regard concerned the stipulation that, in some local authorities, only "approved" contractors could be used to perform upgrades, and only one contractor per upgrade. One PWS owner had been denied access to the grant because he had used more than one company for his upgrade – a condition that he felt had not been made clear when he was informed of the grant by his local authority.

"We got this document saying private water supplies improvement grants scheme...so, we decided as a result to have the water system completely revamped. Finding somebody to do it as a one off was nigh on impossible, because you needed building abilities, plumbing abilities, and electrical abilities, and getting these under one company was nigh on impossible, especially in Argyll and Bute. So, [we employed] a builder, a plumber, an electrician, and bought some filtration equipment from a firm in Rochdale. I said 'Can we have a grant for this?' [The local authority said] 'No, because you've not had it done by one person.'"

(Domestic owner, Exempt)

Frustration was also expressed that the grant could not be used towards the costs of connecting to the mains, where this was a viable and preferred option.

"I contacted them and I said was there a chance I could possibly get on the mains and would the grant be transferable to connecting to mains water? They said 'no'. I thought that was a bit of a missed opportunity because they're going to generate revenue from me connecting to mains."

(Domestic owner, Exempt)

There was considerable variation in the lengths of time participants' current treatment systems had been in place, ranging from as long ago as they could remember (sometimes in excess of thirty years) to a matter of weeks or days. Those who moved into a property with a treatment system already installed rarely knew how long the system had been in place, and almost without exception had not made any changes to it. Most commonly, however, PWS owners reported having had their current treatment system for between five and ten years, and having just not thought about upgrading or changing it as they had not had any issues with it.

Installing treatment systems

Participants who made the decision to install their current treatment system had generally employed a contractor to undertake the installation; in most cases a local plumber, though a small number had drawn on the support of locally-based PWS specialists or a specialist based further afield. The factors informing participants' choice of contractor varied. It

was quite common for non-domestic owners, and to a lesser extent domestic owners, to have followed a recommendation from their local authority or the contractor who installed their supply.

"I think when the Council wrote to me and recommended we put [a treatment system] in, I think they had a list of contractors on the back of suppliers. So, I think they made it easier for me."

(Non-domestic owner, Regulated)

"He was on a list of contractors issued by the Council."

(Domestic owner, Exempt)

Those who had not followed a recommendation but identified a contractor themselves had sometimes opted for a local plumber who had done good work for them in the past. Others had opted for a PWS specialist on the account of their relevant credentials. At the same time, both owners and contractors referenced what they saw as a dearth of PWS expertise in their respective areas. Indeed, some owners said that there had been only one contractor in their area so they had no choice in the matter.

"I assumed he knew what he was doing. He was plumbing my water supply...I see no reason why I should consider any other plumber. Plumbers are plumbers. They connect pipes in a leak-tight manner, hopefully."

(Domestic owner, Exempt)

"I buy all my spares from the [private water supply specialist contractor] who actually installed it. I mean you can trawl the internet, you can trawl other places, he was still the very cheapest for everything I was going to buy."

(Domestic owner, Exempt)

"You just need people who know about private water supplies, and I just don't know who they are. You're at the mercy of...if you phoned a plumber, you wouldn't know that he knew about it or not."

(Non-domestic owner, Regulated)

Most owners who had used a contractor to install their treatment system reported being generally satisfied with the work. However, it was not uncommon for those who had used a plumber, or another non-private water supply specialist, to report more negative experiences. Specifically, there were repeated references to "shoddy" or unfinished work, as well as to the perceived high fees charged by some contractors.

"[The treatment system] is like a sticky plaster...it's a make do and mend...It's the bare minimum. My husband had to do a lot of work himself... It's difficult to get the UV light out."

(Non-domestic owner, Regulated)

"[The contractor] sub-contracted the building of the shed, a little wooden shed that sits over it all which is important to keep the frost off it as much as anything. They sub-contracted that to some joiners who didn't do a good job, it was an incredibly sort of ugly and rickety thing that they hurriedly erected."

(Domestic owner, Exempt)

"I've asked [my plumber] 100 times if we could be on a contract, but he just always says, 'oh yes, yes, yes', and then he never comes, but he's just a typical plumber...He's horribly expensive."

(Non-domestic owner, Regulated)

In light of such experiences, some owners said they would like to have access to a list of local approved or accredited contractors that might help them identify available expertise.

"A guide of who are the best people to contact if you've got an issue with or what to do, one of those things."

(Domestic owner, Exempt)

Some contractors similarly reported having encountered poor installation of treatment systems by plumbers. A specific issue they mentioned in this regard was plumbers not leaving enough space to remove and replace the UV lamps which resulted in the replacement process being unnecessarily difficult and time consuming. One contractor felt that poor quality work by plumbers was in part a reflection of the fact there was no recognised qualification or regulatory body for PWS service suppliers.

"We go into a lot of properties where the person is very proud of these lovely seven filters and UV that's been installed and then [we] get there and, 'Oh, was it your local plumber that put it in?' They go, 'yes' 'Well, he has put that back to front and that's upside down.'...More often than not."

(Contractor, Private water supply specialist)

"You've got to make sure there is enough room to withdraw the bulb out, the lamp out and make sure there is room to remove the sleeve. I've been to sites where that's not the case. [You've] actually got to move the whole thing to remove that, so it's more time consuming."

(Contractor, Non-private water supply specialist)

A minority of participants had installed their water treatment system themselves. This was typically people with a background in engineering, plumbing or horticulture. They perceived the task of installation as straightforward and commented that doing it themselves had not only saved them money, but given them an understanding of how the treatment system worked – which in turn meant they were better placed to maintain it and tackle any problems that arose.

"[I installed it myself] because it was cheaper, and we knew that job would get done properly."

(Domestic owner, Exempt)

"When you do it yourself you know what to fix when it goes wrong, so there's less reliance on having to call somebody out. So that's one big benefit."

(Domestic owner, Exempt)

Overall satisfaction with treatment systems

Most of the PWS owners said they were happy overall with their current treatment systems, which they tended to report had been working well since installation. However, when owners were probed more directly on whether they had encountered any issues with their system, two main themes emerged.

Firstly, and as noted in Chapter 1, the weather was identified as a cause of disruption to treatment systems with heavy rain causing filters to clog. In such circumstances, PWS owners described having to clean the filters or remove sediment from their supply. Domestic users tended to report doing this themselves, while some non-domestic users reported employing a contractor to do the job. In either scenario, participants reported that the task could be quite onerous and/or costly.

"I know with ours if we get a lot of heavy rain over a prolonged period I will have to go out and clean some sediment out of the very top tank because that gets washed down and the initial filter can just get clogged up and you have to put your fingers around it."

(Domestic owner, Exempt)

"Because of the [weather] changes, it's too much water or too little water, the filters get affected, so it costs a lot of money ...I pay [a contractor] a lot of money, because I'm always needing him to sort of do something to the system...it's quite annoying."

(Non-Domestic owner, Regulated)

A second issue mentioned concerned challenges involved in obtaining spare components for treatment systems – both locally and more generally. Specifically, participants and contractors had sometimes struggled to find filters, sand for filters and UV lamp bulbs, as well as smaller components such as nuts. Such challenges meant that some PWS owners had had to go for periods without the right components and, therefore, without their treatment system functioning correctly. This had left some of them feeling anxious about the prospect of not being able to source components in the future.

"The filters, the light bulbs, the pH chips, those sort of things, it's been really difficult to try and find locally to purchase....we go to three different places, one for the pH chips, one for the light, one for the filters, so it's a bit crazy, yeah."

(Domestic owner, Exempt)

"If the UV lamp breaks, that's us stuffed, and we don't have a spare one because we can't find one."

(Non-Domestic owner, Regulated)

Ongoing maintenance of treatment systems

In terms of the ongoing maintenance of their treatment system, owners took varying approaches, ranging from checking the system very regularly, to not checking it at all. Most commonly, participants with water treatment systems reported checking their system every few months, and more frequently during potentially disruptive weather. Specifically, they tended to report checking whether the water was running clear, whether the UV sterilisation was working correctly, and whether the filters needed to be changed.

"Is the UV filter working? Yes. Are the filters being changed as they should be? Yes. Is the water clear?"

(Domestic owner, Exempt)

"Depends on the weather.... [in] this sort of weather ... I sometimes don't look at it for two or three months."

(Domestic owner, Exempt)

Other PWS owners, however, took a more reactive approach to maintaining their treatment system, reporting that they only checked it if there appeared to be a problem with it, and typically only if that problem manifested in water quality issues.

"Well, I know when the filter is starting to go, the water starts to go brown. I know that's when I need to [replace it]."

(Domestic owner, Exempt)

Most participants maintained their treatment systems themselves and there were two main reasons for this. Firstly, they cited the relatively low cost associated with maintaining it themselves, compared with paying a contractor. Secondly, they referred, again, to the relative ease of maintaining the system, not least owing to their familiarity with it.

"Because [my husband] can [perform maintenance] and he doesn't cost me anything."

(Domestic owner, Exempt)

"We know our own system best. Get an outsider in you'll have to tell them what it's all about and by that time you've done it yourself."

(Domestic owner, Exempt)

However, the interviews with contractors threw a somewhat different light on DIY maintenance. They commonly described how PWS users sometimes neglected to perform necessary maintenance tasks regularly, if at all, or did so incorrectly. For example, they mentioned that users rarely changed the UV lamp, or wiped the lamp clean on the recommended yearly

basis. They variously attributed this to owners' forgetfulness or lack of appropriate training, sometimes going on to comment that poor maintenance could result in unsafe water and instances of illness.

"One of the biggest problems I find with a private water supply is that users do their own servicing, which is a bit hit and miss as to when they do it...and they don't have any training to do it properly. They think they've done it correctly, and they haven't, and then a water sample fails, or somebody gets ill. "

(Contractor, Private water supply specialist)

"Once a year the UV lamp should be changed, because UV loses its intensity...nobody ever does, but it's meant to be every year, and the coarse sleeve which the UV lamp shines through, should be wiped clean every year. "

(Contractor, Non-private water supply specialist)

"Initially they are very, very receptive...You recommend every year and they forget every bit."

(Contractor, Non-private water supply specialist)

A minority of owners interviewed had their treatment system serviced by a contractor, either through a contract for annual servicing or on an ad hoc basis. This was mostly non-domestic users, reflecting this group's sense of responsibility for their wellbeing of their customers.

Wider maintenance of PWSs

Both domestic and non-domestic participants commonly reported carrying out wider maintenance on their private water supplies. Generally, this maintenance could be split into three broad categories: ad hoc repairs; general checks and cleaning; and seasonal maintenance.

Ad-hoc repairs were the most common type of maintenance mentioned, and largely took the form of reactive repairs to tanks, plumbing and pumps. However, participants commented that such repairs were rarely needed and, as such, they did not perceive them as a hindrance or source of irritation.

Performing general checks on, and cleaning of, supplies was also relatively common, though the frequency with which participants engaging in such activities varied, from weekly to bi-annually. Typically, they described clearing weeds around the supply site and ensuring that the supply was clean and free of debris, in order to prevent contamination.

Fewer participants reported performing additional, seasonal maintenance; for example, in times of frost or hot weather. Those who did do these things again tended to do so reactively, in response to experiencing specific problems, rather than pursuing a more proactive or preventative approach.

"... [One winter] it was so cold... the pipe that went across from the [tank] ... to the holiday let froze. I had to dig that up in the summer, there was no way, at that time of year there was nothing we could do. I dug it up in the summer and re-laid it deeper."

(Non-domestic owner, Regulated)

A minority of participants felt their supplies did not require any maintenance, beyond that carried out on their treatment systems (and described in the previous chapter). Such participants explained this primarily in terms of their never having experienced any problems with their supply – and not wanting to “fix” what “ain’t broke”.

"[The supply] runs fine; it's clear, it doesn't have silt or peat in it, which would have to be constantly removed or whatever ...I never go near mine because I think I'm just fortunate that, you know, it doesn't need it."

(Non-domestic owner, Regulated)

These findings were reinforced to an extent by the interviews with private water supply contractors, who reported that very few PWS owners proactively thought about maintenance, with most just performing ad hoc maintenance when things went wrong. They described commonly encountering neglected equipment, poor examples of maintenance and a general lack of knowledge and understanding among customers with regard to recommended maintenance. Further, the contractors reported rarely encountering customers with a water safety plan.

"...Most of the infrastructure I look at, you know, wells, and springs, and storage tanks, has quite often not been looked at for 40 years, maybe longer."

(Contractor, Private water supply specialist)

"...when most people think about servicing and maintaining their water supply, they're thinking about the treatment system, if they have one. Very few people consider the whole water supply, and all the infrastructure."

(Contractor, Private water supply specialist)

In addition, contractors reported often coming across reluctance among owners to devote the necessary time and resources to supply maintenance, and, in cases where water sources were shared, conflict between different users around who should take responsibility for maintenance, which in itself was sometimes a cause of inaction.

"It's hard, you know, getting collective responsibility across a water supply is not easy. And the bigger the water supply, the harder it becomes...you'd be surprised how many neighbours don't get on, and it's maybe partly because of the water supply, or partly other factors."

(Contractor, Private water supply specialist)

Generally, the PWS owners interviewed who did have some form of maintenance regime carried out the work themselves. As noted in the previous chapter, this tended to be out of choice – they regarded the work as easy, straightforward and reiterated their view that a DIY approach was cheaper than hiring a contractor. There was also a view among the owners that they were best placed to maintain their own PWS, having acquired an in-depth knowledge of it over the years.

"I know how to do it. Who else do you get to service a well for goodness sake? ... I use my initiative. When it was first dug it was filthy, absolutely minging, because it had upset the sub soil which was shale, thick with manganese, so to start with it was a pretty difficult task, but as the years go by it's got easier and easier."

(Non-domestic owner, Regulated)

"...as soon as somebody comes to you they charge you £100 to get there."

(Non-domestic owner, Regulated)

"... you just...learn about your own supply, you know all the intricacies and that... you would probably have to start explaining it to people, just where everything was and that. It's simpler to do it yourself..."

(Non-domestic owner, Regulated)

Typically, and as is evident in some of the foregoing quotations, participants who performed their own maintenance work had not sought any information or advice on how to do so. They considered it common sense, or something that could be easily learnt through trial and error. Among the minority who *had* sought information or advice, three sources were cited: the internet (typically general searches on Google or YouTube); information from others in the community, such as neighbours or previous owners of the property; and, in the case of maintenance that was perceived as more technical, (such as the replacement of pumps), advice from private contractors. In general, all of these sources were considered to provide good quality information.

"...I would go to neighbours and the internet and, you know, YouTube, rather than a specific website, I wouldn't know a specific place to go to."

(Non-domestic owner, Regulated)

No participants had consulted any, more official or dedicated resources for PWS users in Scotland, such as the DWQR website or the Scottish Government online information hub.

Generally, participants who maintained their supplies themselves were satisfied with the amount of time and effort it took - though some commented that this could be dependent on weather conditions, with heavy rainfall or periods of dry weather at times substantially increasing the amount of maintenance required.

"...the last few months have been horrendous, because we've got this situation... with the [supply drying up] but when it was all working... the maintenance actually was fine, yeah, totally manageable."

(Domestic owner, Exempt)

Less commonly, there were participants who felt that being solely responsible for their own water supply was a constant worry/source of stress. In particular, they reported that parts for the supply and treatment system could be difficult to obtain, so they worried about those breaking. For PWS users generally, difficulties sourcing parts was sometimes compounded by the remoteness of their dwelling or business - some participants commented it that it could take days for parts that were required urgently to arrive.

In terms of the cost of DIY maintenance, participants were largely satisfied with this. They pointed out that the main costs were those associated with ad hoc repairs, which were rarely needed. Additionally, participants felt that such cost, though potentially high depending on the nature of the repair, nonetheless were preferable to the large upfront cost of joining the mains supply and paying monthly water bills.

"... The major cost was when we had to replace the pump and that was probably something like £1500-2000, something like that."

(Domestic owner, Exempt)

"... in terms of the other equipment, which is really just the pump in the borehole, which is the expensive [part of the system] ... if that needs to be changed that'll be changed, but that ...hasn't posed a single problem in the ten years it's been in the... ground."

(Domestic owner, Exempt)

The small number of participants who had hired contractors to perform maintenance on their supplies had typically done so for tasks they perceived to be more challenging or technical - such as repairs to pumps for boreholes or wells. Most had chosen to use the contractor who had installed their treatment system, having had a positive experience of that person or company. Those who had had no previously experience of using a contractor had typically sourced one locally, either through a recommendation, or a simple internet search. However, as explored in Chapter 5, for some, mainly those in very remote or island locations, sourcing contractors with relevant expertise had proven challenging.

"It's finding out people round here who have the ability to do the work in a timely fashion and a cost effective way... that's hard around here I think sometimes."

(Domestic owner, Exempt)

In the main, participants again reported very positive experiences of contractors – most were happy with the contractors' level of expertise and prices. Notably, however, one non-domestic participant had used the same local plumber for a number of years, despite being entirely dissatisfied with the quality of the work – for example, the plumber had recommended and tried to fit the wrong type of pump at a cost of hundreds of pounds. However, she felt she could not change to a different plumber, as this would be socially unacceptable within her small community.

"I would like to have somebody who really understands water systems, because he doesn't. He's listening to stethoscopes into pipes, it's like mumbo jumbo, really.... he doesn't understand it, and I don't understand it really either... I just presumed if you're paying 40 pounds an hour, somebody knows what they're doing, but it's like the blind leading the blind."

(Non-domestic owner, Regulated)

Whether participants used contractors for ongoing maintenance or performed the work themselves, a shared concern among some of them related to the issue of land ownership. Some participants explained that they did not own the land on which their supply was located, which meant they would be required to seek permission from the landowner to undertake any maintenance or repair work that required digging. They were concerned that they might be denied, or charged for, such permission.

"But, if [the water supply owner] wanted to dig it up... you're guaranteed [the land owner] would charge."

(Domestic owner, Exempt)

Support for private water supplies

Appetite for support and advice

There were varying levels of demand for support and advice among the owners and contractors who took part in the research. On the one hand, some owners who had encountered significant issues with their supply, such as test failures or problems of reliability, were keen to receive support or advice. There was a sense that they felt overlooked by Scottish Water and their local authority, and “left alone” to cope.

“Their honest view is ...because you’re off grid, you should be on mains...you’re a nuisance, they don’t actually recognise that private water supplies are a fundamental part of rural life in Scotland, and [there’s] no point putting too many rules and regulations in place, because we’re all running different ad hoc systems.”

(Non-domestic owner, Regulated)

“(Scottish Water) laughed at me, they said we were uphill and [connection to the mains] ain’t happening...and there weren’t enough of us.”

(Non-domestic owner, Regulated)

Other owners were more lukewarm in their attitude towards support and advice, seeing it either as something that could *potentially* be helpful in the future should they encounter specific difficulties or something that was more appropriate for people who were newer to PWSs.

A third group of owners were more actively resistant to support and advice, priding themselves on their self-reliance and reiterating a wariness of outside “interference”.

“And I take a general bit of pride in being a bit independent of bureaucracy not [having them] standing, breathing down my neck.”

(Domestic owner, Exempt)

“Someone would have to gain my trust and that would take a lot of doing regarding my water.”

(Domestic owner, Exempt)

The contractors interviewed generally felt that they had sufficient knowledge and understanding of PWSs, including treatment systems, to provide a full and effective service to owners. They said they had typically gained this knowledge and understanding through first-hand experience on the job, as well as from working with treatment system manufacturers and other suppliers. Less commonly, some of the PWS specialists reported having receiving formal technical training within their workplace.

"I've been in the pump industry for 40 years and I started my own business and I gained [knowledge] from there, from other people like Goodwater, down in London, Aquacure, these sort of companies and take it on board, remember things."

(Contractor, Non-private water supply specialist)

"Usually [a supplier] comes to me, if somebody has got a new product on the market they usually approach me."

(Contractor, Non-private water supply specialist)

"The vast majority of our training is in house training."

(Contractor, Private water supply specialist)

Despite this, the contractors were generally receptive to the idea of additional support and advice being provided, both to them personally and to those dealing with PWSs more generally.

Awareness of available support and advice

Across the board, there was low awareness of available support provision for PWS users. To some extent, this appeared to reflect the fact that relatively few participants had actively sought out such information, either because they had not experienced any difficulties with their PWS, or because they were confident in their own ability to manage their supply without outside help.

"I didn't need any information, I said before I'm a design engineer, a physicist, a mathematician."

(Domestic owner, Exempt)

"I could probably be a private water supply consultant and charge £400 an hour... I know enough about the world not to need to ask Google's help [with] how to run my private water supply."

(Non-domestic owner, Exempt)

Those who had looked for advice or guidance on maintaining or treating their supply sometimes commented that it had been difficult find relevant, impartial information. They had generally searched for this guidance online, and the sources they had come across were predominantly commercial in nature (for example, manufacturers websites) or related to PWSs in other countries.

"...when we first looked [for information online] we didn't find anything [so] we've... not repeated the [search] necessarily."

(Domestic owner, Exempt)

"I certainly do recall I spent some time looking at various websites at how water treatment was managed, and frankly most of that information, if I remember correctly, was American, and they have slightly different ordinances in their various counties or whatever as to how they deal with water supplies."

(Domestic owner, Exempt)

Almost without exception, neither owners nor contractors had heard of the Scottish Government's online information hub on PWSs. They commonly expressed frustration that the hub has not been brought to their attention, and/or suggested that greater effort should be made to publicise it to PWS owners. Specific suggestions made in this regard included adding an article about the hub to relevant MSPs' newsletters or adding a flyer to the Council Tax bills of known PWS households.

"I didn't know [the hub] existed. How was I to know it existed? How was anyone to know? ...if they put in one or two days a year to ...get them promoting their information for people, [it] would then spread the word."

(Contractor, Non-private water supply specialist)

"I mean that sort of information is really powerful, but it's getting it out there isn't it?"

(Domestic user, Exempt)

There was marginally more awareness of the guidance on the DWQR website, particularly among non-domestic users and contractors. However, among those who had used it, there was a perception that the content was somewhat basic and limited in scope.

"We've looked at it but it's not really helpful. [What they're suggesting] we're [already] doing it - there's no more."

(Non-domestic user, Regulated)

Types of support favoured

Owners who were interested in receiving support or advice relating to their PWS discussed five main areas of need: treatment systems and regimes; maintenance regimes; accessing contingency supplies; water testing; and accessing contractors.

Treatment systems and regimes

Some of the participants who treated their supply – and particularly those who had inherited their current treatment system, along with a small minority of those who did not treat their supply – said that more guidance on best practice in treatment would be helpful. Specifically, they expressed a desire for information on how best to address specific water quality issues, the relative merits of different treatment systems/components, and the types and frequency of maintenance required on these.

"There's no real advice from the Council to say this is what the problems are, this is what you can do [to treat your water] ... [Some of] the solutions cause problems and we're not water technicians."

(Non-domestic owner, Regulated)

"[It would be helpful to know] the recommended treatment steps that you have between well to your tap as it were, because we've just assumed that what the previous people have put in is sufficient and because we had our test passed, but actually we have no idea what is recommended for things like the frequency of [changing] filters."

(Domestic owner, Exempt)

Maintenance regimes

Asked whether they would value any additional support in relation to the wider ongoing maintenance of their supply, participants commented that some sort of reference or 'trouble-shooting' guide with advice on dealing with specific maintenance issues they might face would be useful. A specific issue cited in this regard was the replacement of pumps. Those who had not yet had to replace their pump expressed some trepidation about having to do so in the future.

"I think the other thing in terms of, like, information that would be useful is just a quick reference guide of who are the best people to contact if you've got an issue or what to do."

(Domestic owner, Exempt)

"The pump is bound to fail one day. [It is still working] thank goodness."

(Non-domestic owner, Regulated)

Accessing contingency supplies

Participants expressed a desire for improved access to contingency supplies of water in the event that their supplies dry up. This included both those with direct personal experience of their supplying drying up and those who were aware of it having happened to others in their local area. As illustrated in Chapter 2, there were references to recent examples of good practice amongst local authorities, which included the provision of bottled water or bowsers to affected owners. Equally, however, there were references to less positive examples; for example, a Council running out of bowsers.

"The only thing I worry about with our one is because we are a single source spring, springs move, springs dry up. What do we do then? We would have to actually go and sink another well."

(Domestic owner, Exempt)

"Well, [the Council] gave you bowsers, if you ran out of water you could phone them and they would then come and organise something for you, but they ran out of bowsers. "

(Domestic owner, Exempt)

Support with water testing

There was a perceived need for more frequent and free or cheaper testing by local authorities amongst both domestic and non-domestic owners. Additionally, and even amongst those willing to pay for tests, there was an appetite for more reminders of when tests were due to remove the burden of remembering from PWS owners.

"Think they make you pay for [testing], yeah, and if it doesn't pass you're knackered."

(Domestic owner, Exempt)

"If somebody sent me a letter saying it's time to do another test, then that's something I would do...as long as they didn't charge me a lot of money for it."

(Non-domestic owner, Regulated)

"All they've got to do is to drop us a line saying 'right, it's been two years, would you like your water tested?' If I don't feel I need it tested I could ring them and say 'no thanks', but otherwise I could say 'yeah okay I'll send you a sample.' "

(Domestic owner, Exempt)

Accredited contractor list

In light of difficulties some owners had encountered sourcing contractors, there was an appetite for a list of local approved or accredited contractors that might help in the identification of available expertise – not all participants were aware of existing lists kept by local authorities.

"A guide of who are the best people to contact if you've got an issue with or what to do, one of those things."

(Domestic owner, Exempt)

There was somewhat less support for an approved contractor list among contractors themselves, however. They raised two main concerns about such a resource.

Firstly, there was concern the requirements for accreditation might be minimal in terms of training, and cost with the effect that contractors who are incompetent and/or have very limited experience may be able to become accredited. With this in mind, one contractor suggested that any accreditation system would need to incorporate a "grading" system to enable PWS owners to differentiate between PWS specialists with high levels of expertise and experience, and other contractors, such as plumbers, who might not service treatment systems "correctly".

"A centralised place for a list would be a great benefit, I think, to private water supply users. But I think, it would have to be graded, because not everybody does everything... You could have a company like Highwater who do everything...but you can also get plumbers who install UVs, and service them. Some do it correctly, some don't."

(Contractor, Private water supply specialist)

"I would be terrified if it was...like landlords' registration...if any Tom, Dick and Harry, would just go and do that half day course or just have to fill a form and send off their CV that they can get this logo that says something about private water supplies...loads of [contractors] would flood the market trying to do what they don't know. That would give probably a very false sense of security for a lot of end users. "

(Contractor, Private water supply specialist)

A second concern about an accredited list among contractors was that if achieving accreditation *did* cost money, this could potentially exclude smaller contractors, including PWS specialists, who may not be able to afford the accreditation.

"[But] I suppose, say there was a charge to become accredited, that would preclude certainly smaller operators like myself."

(Contractor, Private water supply specialist)

"I would be, [interested] but the problem is I don't spend money on these kind of things, because you have got to pass it on to the customer."

(Contractor, Non-private water supply specialist)

Financial Support

Finally, there were calls for increased financial support for PWS owners. Some participants expressed a desire for a higher grant to cover upgrades to their supply or treatment system, including the drilling of boreholes. Others favoured financial support to connect to the mains water supply.

"If they would give a subsidy for boring, that would be a great thing, because there might have been water if we'd bored again, but after you've spent that amount of money, you don't feel like doing it again."

(Non-domestic owner, Regulated)

"Rather than have a grant for improving pipe supplies they should pay a grant to connect to the mains because that might be cheaper."

(Domestic owner, Exempt)

Additional forms of support for contractors

The contractors interviewed identified three additional forms of support and advice that they would find useful. Firstly, there was an appetite among some of them for more independent technical advice on PWSs as opposed to commercial information from suppliers.

"Occasionally, you come across a contaminant in the water supply that you haven't come across before... So in those cases, it can be really quite tricky, because the body of knowledge is not there. "

(Contractor, Private water supply specialist)

"[Information has] got to be purely independent...if you start using suppliers or manufacturers you're getting rose-tinted glasses."

(Contractor, Non-private water supply specialist)

Secondly, there was mention of a need for increased information on relevant regulatory developments and requirements. One contractor expressed a view that neither contractors nor local authorities were being updated with sufficient notice about the rolling out of new regulations, which made it difficult to perform their jobs effectively.

"It's been a little bit farcical the way that they rolled out the new regulations. I feel sorry, again, for the people in the local authorities and the private water supply teams, [who] are literally being told what the new regulations were the week of the date they come in."

(Contractor, Private water supply specialist)

Thirdly, there was a desire for more information on health and safety risks associated with PWSs, and specifically the risk of illness from untreated or inadequately treated supplies, that contractors could share with customers. On a related point, one interviewee felt contractors would benefit from having access to water safety plan templates for dissemination.

"There is very little statistical proof that a private water supply, without treatment, can be harmful to health. And that's something that I would find very useful to have."

(Contractor, Non-private water supply specialist)

Preferred sources and modes of support and advice

Most owners did not express specific or strong preferences in terms of *who* should provide support and advice on PWSs. However, there was repeated mention of a need for a non-commercial, independent body to oversee the process; and one that carried "authority".

"I think what I want to say is the Government. But, whether it's the local government or regional government or national, I don't know."

(Contractor, Non-private water supply specialist)

"Whether the Scottish Government or Citizens Advice....as long as it is somebody with a bit of authority."

(Domestic owner, Exempt)

At the same time, some non-domestic owners expressed a desire for improved support from local authorities. Specifically, they were keen for these bodies to focus less on "checking up on" or "policing" them and more on helping them address issues they experienced with their supply, including test failures.

"The problem is [the local authority] are giving us regulation and they're giving us £800 but they're really not giving us support. It's basically you take this money, you put the system in and if it fails hell mend you...We feel, whether rightly or wrongly, it's becoming punitive."

(Non-Domestic owner, Regulated)

For their part, some of the contractors were keen to see the DWQR doing more to engage with them and others delivering PWS services, to keep them updated on developments in relevant regulation and best practice.

I guess DWQR will determine how much carrot and how much stick are we going to use to improve and drive up the standards of private water supplies. They're not speaking to us about best practice or [asking us] to change our advice that gets handed on to the end users, so it's probably could do with a wee bit more effort to...engage with us."

(Contractor, Private water supply specialist)

In terms of *modes* for delivering support and advice, owners commonly expressed a preference for online communication, as they could access it from any place. However, others favoured more traditional off-line communications, both because they were older and/or lived in very remote areas so did not use the internet, and because online sites could be difficult to find. Specific off-lines modes mentioned ranged from radio, to relevant face-to-face – for example, community councils – and leaflets enclosed with Council Tax bills.

"That's the problem with anything that's online, 'go and look at the website.' Well, if you don't know it's there you're not going to look for it."

(Non-domestic owner, Regulated)

"I was on a community council for eight years or something and I think it was maybe mentioned once, but I think it would probably be something that would be quite handy to have out in the open a bit more."

(Domestic owner, Exempt)

"I tell you where would be an ideal place to put that information, on our Council Tax bills."

(Domestic owner, Exempt)

"I listen to Radio 4 quite a lot [and] Radio Scotland, so it could be advertised through the radio."

(Domestic owner, Exempt)

Contractors generally favoured face-to-face forms of knowledge exchange. They explained this with reference to the fact that it allowed scope for visual demonstrations, and for engagement between attendees. Seminars or periodic meetings were two specific modes of delivering support suggested by this group, with one interviewee suggesting that wider relevant professionals, such as solicitors and architects, could also be invited.

"I would like to think there would be periodic meetings where you're face to face...because I think an app, a website, a letter, email, can tend to be read wrongly or read incorrectly or not read at all...So, I think face to face, displays, demonstrations, et cetera...or even one or two, people who are relevant are sitting there telling you different things that are new that are coming along or what has happened."

(Contractor, Non-private water supply specialist)

"The easiest thing would be to go and do little seminars and go and meet solicitors, go and meet architects, go and get the private water supply team from local authorities and do little sort of sessions, lunch time sessions with them, that's who we should be speaking to."

(Contractor, Private water supply specialist)

Conclusions and Recommendations

Conclusions

The principle objective of the research was to provide insight into the criteria applied by consumers responsible for private water supplies when choosing water treatment systems and maintenance regimes. **However, one of the key findings of the research was that many domestic PWS owners do not in fact have a treatment system and/or maintenance regime** and, as such, are relying on water from raw, unfiltered sources. This most commonly reflected their belief that their water was pure and safe to drink in the absence of such measures – and certainly superior to mains water.

Whilst use of treatment systems and maintenance regimes was more prevalent among *non-domestic* PWS owners, this appeared largely due to the legal requirements upon them – several of them clearly felt that their supply would be safe without treatment, as evidenced by the fact they chose to treat only the supply that served their business, leaving their home supply in its raw form.

Owners who did have treatment systems applied a very limited range of criteria in choosing these. Typically, they based their choice almost entirely on a recommendation from their local authority or a contractor; in essence delegating full decision-making powers to such third parties, rather than undertaking research on the topic themselves. The small number of owners who *had* undertaken their own research commonly relied on general internet searches or the websites of private water supply contractors or treatment system manufacturers. None had consulted more 'official' information sources, including the DWQR website or the Scottish Government information hub.

Cost emerged as another key criteria influencing owners' choice of system: they often reported opting for the cheapest system they could find. Some of those who had used the £800 grant reported having chosen systems with prices within the grant amount, to avoid incurring additional direct costs themselves, even though this may have meant compromising on quality.

Consumers who had used contractors to assist with the treatment and maintenance of their PWSs sourced this expertise in a variety of different ways. Most commonly they had used a local plumber based on previous experience or word of mouth; or had sourced a private water supply specialist, either through an internet searches, a recommendation or their local authority's contractor lists. While those who had used a specialist contractor were generally satisfied with the work, it was not uncommon for those who had used a plumber (or other non-PWS specialist), to report more negative experiences, such as incorrect advice or poor workmanship.

The small number of consumers who had chosen their treatment system based on their own research, felt that the information they accessed was readily available, though they often noted that they had not dedicated much time to looking, instead selecting one of the first websites in their search results. Still, they reported having found the information clear, as did the contractors interviewed.

The maintenance regimes owners and contractors performed on treatment systems (and PWSs more generally) varied considerably. Most commonly, owners checked their system and supply every few months, and more frequently during potentially disruptive weather. They tended check that the water was still running clear, that the UV sterilisation was working correctly, and whether the filters needed to be changed. Other owners took a more reactive approach, checking

their system or supply only if there appeared to be a problem with it, and typically only if that problem manifested in visible water quality issues.

Most participants maintained their treatment systems themselves, stating it was more cost effective than hiring a contractor to do so, and regarding the process as easy and straightforward. However, the interviews with contractors threw a somewhat different light on these findings: The contractors commonly described how PWS users sometimes neglected to perform necessary maintenance tasks regularly, if at all, or did so incorrectly.

A minority of supply owners had their treatment system serviced by a contractor, either through a contract for annual servicing or on an ad hoc basis. Those with such arrangements were typically non-domestic owners, reflecting this group's sense of responsibility for their wellbeing of their customers.

Recommendations

Implicit in the foregoing and throughout the report are a number of ways in which those responsible for private water supplies may be better supported, in both policy and practice terms, to make decisions regarding the treatment and maintenance of their supplies.

Access to information and support on connecting to the mains water supply

As in the 2017 research on support systems for PWS users¹⁰, there was an apparent lack of clarity among participants about connecting to the mains, with many making assumptions about the process – for example, that it was prohibitively expensive, or not possible from their location – despite having never looked into it. Others commented on the difficulty of finding information about connecting to the mains, or knowing who to approach for information.

These findings underscore the need for local authorities and/or Scottish Water to proactively provide PWS owners with definitive information on whether or not connecting to the mains is an option for them, what this would entail, and what financial and practical support (if any) is available, including in relation to relevant legal and planning requirements.

More engagement with supply owners around water quality testing and risk assessment

Given the infrequency with which domestic participants tested their supplies, there is a clear need for a redoubling of efforts by local authorities and DWQR to proactively communicate the importance of testing and risk assessment to this group. This should include highlighting the importance of testing as a tool for ensuring treatment systems are working correctly and addressing possible health risks. The potential value of such efforts is evidenced by the finding that previous steps taken by local authorities to encourage testing (for example, in the form of mail outs to households with PWSs) have in some cases had the desired effect.

Given the finding that specific personal triggers can encourage people to get their supply tested – for example, having children, or developing an illness – there may be value to be had from highlighting such considerations within any future communications around PWSs and testing. Some owners may not realise that the young and those whose immune systems are comprised can be more susceptible to contaminants, and this information may make them more likely to engage in testing.

¹⁰ Ipsos MORI Scotland, (2018). Support systems for people reliant on private water supplies. Not yet published.

At the same time, given the perception among some owners that the costs associated with water testing are too high, consideration should perhaps be given to the development of an appropriate subsidy. Of course, this would need to be sufficiently publicised to ensure take up.

Improved information and support in respect of testing should go hand in hand with guidance on what owners should do in the event of a test failure (and, indeed, how to avoid such a failure). Specifically, and based on participants' feedback, it appears there may be scope for local authorities to provide better information on measures for improving water safety, including risk assessments, the installation of treatment systems and water safety plans.

Local authorities, along with the DWQR and the Scottish Government, should also consider highlighting risks associated with commonly employed home-made treatment systems, such as those described in Chapter 3. Such information too could be incorporated into any future communications or other interactions with owners around testing.

Reviewing the Private Water Supply Grant

Whilst the Private Water Supply Improvement grant can be used towards any improvement to the quality of a supply, awareness of this was generally low amongst owners. As such, there is a need to raise awareness of the purposes for which the Grant can be used.

Furthermore, the research suggests several ways in which the Private Water Supply Grant might be reconfigured, to make it more appealing to PWS owners: namely, to increase the value of the Grant to make it more reflective of the actual cost of (high quality) treatment systems, and review conditions attached to the Grant with a view to making these appear less coercive.

Raising awareness, and improving the content of, existing sources of information and support; in particular, the DWQR website and Scottish Government information hub

Participants' very low awareness of the DWQR website and the Scottish Government information hub raises questions as to the current effectiveness of these potentially valuable resources. The research identified specific ways in which awareness might be increased, including the inclusion of articles about the hub in relevant MSPs' newsletters; and the addition of a flyer to the Council Tax bills of known PWS households.

At the same time, the research pointed to various ways in which the information contained within existing information sources might be expanded to better support PWS owners in respect of treatment and maintenance. Specifically, it suggests there is a need for more information on:

- How best to source reputable contractors – and the added benefits of using a PWS specialist contractor, over a plumber. At the same time, and given the apparent dearth of (reputable) contractors in some areas, there may be scope for Scottish Water to provide a paid for private water supply treatment service to owners. Some owners expressed a desire for an accredited list of contractors: however, given concerns about such a resource among the contractors interviewed, there may be value in developing such a resource in consideration with contractors themselves.
- Seasonal maintenance – specifically, how to proactively mitigate and address potential issues associated with periods of hot/cold weather. As well as adding this information to the existing websites, local authorities could deliver leaflet to households with PWSs at appropriate points in the year to provide a timely reminder of steps they might consider taking.

- A user-friendly help card or check list highlighting important maintenance tasks more generally. Though the Scottish Government hub contains information about cleaning supplies, fuller information could be incorporated to provide a more comprehensive resource. This might include information on how regularly treatment systems should be checked, how to prevent supply contamination, and support with sourcing components for treatment systems and PWSs more generally
- Given apparent uncertainty around legal issues affecting PWSs (such as those pertaining in instances where water supplies are shared and disputes occur, or when sources are located on land not owned by the supply owner) and the potential for this to lead to inaction on treatment and maintenance, there is clear need for information on such issues. As well as including such information in existing resources, such as the online hub, there is a role for Citizens Advice Scotland in providing support to private water supply users in this regard, for example, by offering assistance with disputes over rights and responsibilities, and by providing independent advice and arbitration in these circumstances.

Improved support for contractors

Given the perception among contractors that they, and local authorities, were not being kept sufficiently up to speed on regulatory changes and associated requirements, DWQR should give consideration as to how it can better engage with this audience. This might involve disseminating e-communications to a mailing list that contractors sign themselves up to, and, as one contractor suggested, hosting events, such as training, that they can attend.

Supporting and streamlining the process for installing boreholes

As boreholes can provide a much safer source of water than surface supplies, there should be a focus on encouraging owners to shift to these where applicable. In the process, and based on both owners' and contractors' feedback, there may be scope to review existing processes for obtaining permission to drill boreholes, to ensure it is as streamlined as possible for all concerned, and consistent across local authorities.

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